Functions Worksheet

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Qualification: GCSE Edexcel Higher

Areas: Functions

Subtopics: Substitution, Composite Functions

Paper: Paper-2H-Calculator / Series: 2018-June / Difficulty: Easy / Question Number: 11

11 f and g are functions such that

$$f(x) = \frac{2}{x^2} \quad \text{and} \quad g(x) = 4x^3$$

(a) Find f(–5)

.....

(1)

(b) Find fg(1)

.....

(2)

(Total for Question 11 is 3 marks)

17 The function f is such that $f(x) = \dfrac{3}{x-2}$

(a) Find f(1)

.....

(1)

(b) State which value of x must be excluded from any domain of f

.....

(1)

The function g is such that $g(x) = x + 4$

(c) Calculate fg(2)

.....

(2)

(Total for Question 17 is 4 marks)

Qualification: GCSE Edexcel Higher
Areas: Functions
Subtopics: Inverse Functions, Composite Functions, Functions With Algebra
Paper: Paper-1H-Non-Calculator / Series: 2023-June / Difficulty: Medium / Question Number: 20

20 For $x \geqslant 0$, the functions f and g are such that

$$f(x) = 3x + 4 \qquad g(x) = \frac{\sqrt{x} + 2}{5}$$

(a) Find $g^{-1}(x)$

$g^{-1}(x) =$ .....

(2)

(b) Solve $gf(x) = 3$

$x =$ .....

(3)

(Total for Question 20 is 5 marks)

19 f and g are functions such that

$$f(x) = \frac{12}{\sqrt{x}} \quad \text{and} \quad g(x) = 3(2x + 1)$$

(a) Find g(5)

.....

(1)

(b) Find gf(9)

.....

(2)

(c) Find $g^{-1}(6)$

.....

(2)

(Total for Question 19 is 5 marks)

17 The function f is such that $f(x) = (x - 4)^2$ for all values of x.

(a) Find f(1)

.....

(1)

(b) State the range of the function f.

.....

(1)

The function g is such that $g(x) = \frac{4}{x+3}$ $x \neq -3$

(c) Work out fg(2)

.....

(2)

(Total for Question 17 is 4 marks)

15 The function f is defined as

$$f: x \mapsto \frac{3x+1}{x-2}$$

(a) State the value of x that cannot be included in any domain of the function f

.....

(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

$f^{-1}(x) =$ .....

(3)

(Total for Question 15 is 4 marks)

Qualification: IGCSE Edexcel A Higher
Areas: Functions
Subtopics: Inverse Functions, Composite Functions, Domain of Functions
Paper: Paper-1H / Series: 2018-June / Difficulty: Medium / Question Number: 14

14 The function f is such that

$$f(x) = \frac{3x - 5}{4}$$

(a) Find f(–7)

.....

(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

$f^{-1}(x) =$ .....

(2)

The function g is such that

$$g(x) = \sqrt{19 - x}$$

(c) Find fg(3)

.....

(2)

(d) Which values of x cannot be included in any domain of g?

.....

(2)

(Total for Question 14 is 7 marks)

10 $f(x) = 4\sin x°$

(a) Find f(23)
Give your answer correct to 3 significant figures.

.....

(1)

$g(x) = 2x - 3$

(b) Find fg(34)
Give your answer correct to 3 significant figures.

.....

(2)

$h(x) = (x + 4)^2$

Ivan needs to solve the following equation $h(x) = 25$

He writes

$(x + 4)^2 = 25$
$x + 4 = 5$
$x = 1$

This is not fully correct.

(c) Explain why.

.....

.....

(1)

(Total for Question 10 is 4 marks)

Qualification: IGCSE Edexcel A Higher
Areas: Functions
Subtopics: Domain of Functions, Composite Functions, Inverse Functions, Approximation of Gradient
Paper: Paper-2HR / Series: 2019-June / Difficulty: Medium / Question Number: 18

18 The functions f and g are defined as

$$f(x) = \frac{x}{4x - 3} \quad \text{and} \quad g(x) = x - 5$$

(a) State which value of x must be excluded from any domain of the function f.

.....

(1)

(b) Find $fg(x)$.
Simplify your answer.

$fg(x) =$ .....

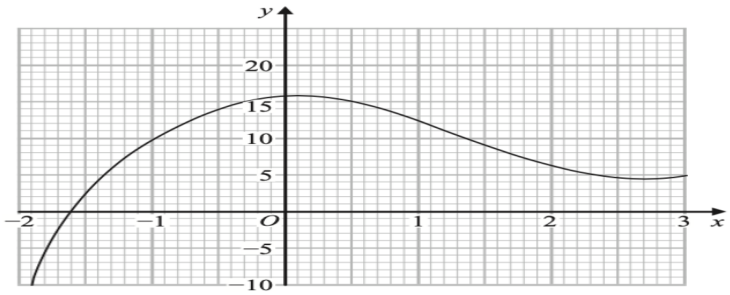
(2)

(c) Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

$f^{-1}(x) =$ .....

(3)

Part of the curve with equation $y = h(x)$ is shown on the grid.



(d) Find an estimate for the gradient of the curve at the point where $x = -0.5$
Show your working clearly.

.....

(3)

(Total for Question 18 is 9 marks)

19 The functions g and h are such that

$$g(x) = \sqrt[3]{2x-5} \qquad h(x) = \frac{1}{x}$$

(a) Find g(16)

.....

(1)

(*b*) Find $hg^{-1}(x)$
Give your answer in terms of x in its simplest form.

$hg^{-1}(x) =$ .....

(3)

(Total for Question 19 is 4 marks)

19 For all values of x

$$f(x) = (x + 1)^2 \quad \text{and} \quad g(x) = 2(x - 1)$$

(a) Show that $gf(x) = 2x(x + 2)$

(2)

(b) Find $g^{-1}(7)$

.....

(2)

(Total for Question 19 is 4 marks)

21 The functions f and g are such that

$$f(x) = 3x^2 + 1 \quad \text{for } x > 0 \qquad \text{and} \qquad g(x) = \frac{4}{x^2} \quad \text{for } x > 0$$

(a) Work out gf(1)

.....

(2)

The function h is such that $h = (fg)^{-1}$

(b) Find $h(x)$

.....

(4)

(Total for Question 21 is 6 marks)

24 The function f is such that $f(x) = 3x - 2$

(a) Find f(5)

.....

(1)

The function g is such that $g(x) = 2x^2 - 20x + 9$ where $x \geqslant 5$

(b) Express the inverse function g^{-1} in the form $g^{-1}(x) = ...$

$g^{-1}(x) =$ .....

(4)

(Total for Question 24 is 5 marks)

18 The function f is given by

$$f(x) = 2x^3 - 4$$

(a) Show that $f^{-1}(50) = 3$

(2)

The functions g and h are given by

$$g(x) = x + 2 \text{ and } h(x) = x^2$$

(b) Find the values of x for which

$$hg(x) = 3x^2 + x - 1$$

.....

(4)

(Total for Question 18 is 6 marks)

16 The function f is such that

$$f(x) = \frac{2}{3x-5} \quad \text{where } x \neq \frac{5}{3}$$

(*a*) Find $f\left(\frac{1}{3}\right)$

.....

(1)

(*b*) Find $f^{-1}(x)$

$f^{-1}(x) =$ .....

(2)

The function g is such that

$$g(x) = 5x^2 - 20x + 23$$

(*c*) Express $g(x)$ in the form $a(x - b)^2 + c$

.....

(3)

(Total for Question 16 is 6 marks)

17 The functions f and g are defined as

$f(x) = x^2 + 6$
$g(x) = x - 10$

(a) Find fg(3)

.....

(2)

(b) Solve the equation $fg(x) = f(x)$
Show clear algebraic working.

.....

(3)

The function h is defined as

$$h(x) = \frac{2x - 4}{x}$$

(c) State the value of x that cannot be included in the domain of h

.....

(1)

(d) Express the inverse function h^{-1} in the form $h^{-1}(x) = \ldots$

$h^{-1}(x) =$ .....

(3)

(Total for Question 17 is 9 marks)

25 The function f is such that $f(x) = 3x^2 - 12x + 7$ where $x \leqslant 2$

Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

$f^{-1}(x) =$ .....

(Total for Question 25 is 4 marks)

18 The function f is such that $f(x) = \frac{k}{x}$ where $x \neq 0$ and k is an integer.

(*a*) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

$f^{-1}(x) =$ .....

(1)

The function g is such that $g(x) = 2 - 3x^4$ where $x \neq 0$

The function h is such that $h(x) = \frac{3x}{2-x}$ where $x \neq 2$

(*b*) (i) Find $g(-2)$

.....

(1)

(ii) Express the composite function hg in the form $hg(x) = ...$
Give your answer in its simplest form.

$hg(x) =$ .....

(2)

(Total for Question 18 is 4 marks)

23 The functions f and g are such that

$$f(x) = x + 25 \qquad g(x) = x^2 - 12x$$

The function h is such that $h(x) = fg(x)$

The domain of h is $\{x : x \leqslant 6\}$

Express the inverse function h^{-1} in the form $h^{-1}(x) = ...$

$h^{-1}(x) =$ .....

(Total for Question 23 is 4 marks)

21 The function f is such that $f(x) = 5 + 6x - x^2$ for $x \leqslant 3$

(a) Express $5 + 6x - x^2$ in the form $p - (x - q)^2$ where p and q are constants.

.....

(2)

(b) Using your answer to part (a), find the range of values of x for which $f^{-1}(x)$ is positive.

.....

(5)

(Total for Question 21 is 7 marks)

22 The functions f and g are such that

$$f(x) = 5x + 3 \qquad g(x) = ax + b \qquad \text{where } a \text{ and } b \text{ are constants.}$$

$g(3) = 20$ and $f^{-1}(33) = g(1)$

Find the value of a and the value of b.

$a =$ .....

$b =$ .....

(Total for Question 22 is 5 marks)

Qualification: GCSE Edexcel Higher
Areas: Functions
Subtopics: Composite Functions, Inverse Functions
Paper: Paper-2H-Calculator / Series: 2022-November / Difficulty: Hard / Question Number: 22

22 $f(x) = \sqrt[3]{x}$
$g(x) = 2x + 3$

$h(x) = fg(x)$

Find $h^{-1}(x)$

$h^{-1}(x) =$ .....

(Total for Question 22 is 3 marks)

23 The function f is defined as $f(x) = \dfrac{\sqrt{x^2 + k^2}}{x}$ for $x > 0$ and where k is a positive number.

(a) Find the value of p for which $f^{-1}(p) = k$

$p =$ .....

(3)

The function g is defined as $g(x) = x^2$ for $x > 0$

(b) Given that $gf(a) = k$ for $k > 1$
find an expression for a in terms of k.

$a =$ .....

(3)

(Total for Question 23 is 6 marks)